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Committee on Energy and Commerce

Subcommittee on Telecommunications and the Internet
Hearing on the "Digital Future of the United States: Part IV: Broadband Lessons from Abroad"

Chairman Markey, Ranking member Upton and Members of the Committee. I am honored by your request for my attendance at this hearing. More so, I am appreciative that the positive impact of broadband on developing nations is given an opportunity to take a stage in your decision making. I have but one of many small success stories in the developing world where broadband has helped bring economic empowerment, equality, democracy and change to a developing area. I am also here, as an American, to testify that it is in America's interest, both economically and socially to bring broadband infrastructure to the developing world.

To introduce myself I am a native of Massachusetts and was in the public school system through my college degree. In the early 1990's I left school to start a semi-conductor cooling company. The business grew quickly we became a leading supplier to Dell, Hewlett-Packard, IBM, and now even the xbox 360. After selling the company in 1998 I spent time in open source software, including to help fund a successful internet company through its public offering. Soon after this I decided to devote my time towards the developing world. This is how and where I was introduced to Rwanda.

In Rwanda we have developed a world class infrastructure including the first African deployments of both fiber to the premise and EVDO mobile broadband. I have personally witnessed the positive impact of broadband on many parts of this rural, growing economy, including successful poverty reduction and

medical treatment strategies. Two examples; 1) the efficient distribution of aids drugs requires an electronic infrastructure to determine patterns, dosage and effect. Software from Voxiva (Maryland) creates web sites to visually map these items and electronically collect the data from the various health centers., and 2) Columbia University has had a very successful large scale poverty reduction program (millennium challenge) in which telecommunications for e-health, education and even sales of corn have played a well documented part of its success as written about in the Philadelphia Enquirer[i] and San Francisco Chronicle, *"Fiber Optics to Rwanda's Rescue"*[ii]

1: Internet Penetration in Rwanda

In 2003 I visited Rwanda with a goal of connecting some schools to the internet and learning about how else I could contribute. I found very little broadband access. For instance, the PTT had 22 internet connections greater than 64kbps, with pricing of $1000 per month for 64kbps, or $2000 per month for 128kbps. With a population of over 8,500,000, the internet tele-density of Rwanda was very low. Rwanda was in a catch 22, no one would invest in internet infrastructure because there were few users, and there were few users because there was no infrastructure.

Because of the desperate need, in 2004 with an investing partner, we formed a small ISP to bring internet to schools. Hiring an entirely local staff we climbed roofs, laid fiber and brought the latest technologies to Rwanda. We now have almost 400 Rwandan employees and provide internet access to approximately 50,000 end-users.

The fiber network, designed, installed and maintained entirely by Rwandans covers almost 400km, inter-connecting approximately 150 buildings including 6 of the 7 public colleges and all of the Government Ministries. Our EVDO broadband deployment brings high speed mobile networking throughout the country, including every city and many rural areas.

The Rwandan economy has outpaced its peers growing over 9% per year, and technology exports are beginning. Such exports include a partnership with Solidworks (Concord, Massachusetts), a leading mechanical cad design firm which is working with the students of ETO Gitaramma to produce 3d components for an online 3d library.

Software businesses have been formed which focus on providing services over this infrastructure. For instance, in 2004 bank branches were not inter-connected. A deposit in one branch had no relation to a balance in another branch. Simultaneously with our inter-connecting bank branches, some employees formed a new company to develop software for coordinating inter-branch deposits and withdrawals.

Another example is in revenue collection. Because we could connect major tax payment locations via fiber, the revenue authority hired local and foreign software engineers to develop a web based customs and tax payment portal. This increased both the time and amount of revenue collections.

Pricing has played a major factor in penetration. The prices charged are the lowest in Africa and access costs for end users are similar to the US. For instance, EVDO mobile broadband service is approximately $60 USD per month, similar to both Verizon and Sprint. DSL services start at $70 per month including a fixed telephone line, comparable to Verizon DSL and phone service (but only for 256kbps in Rwanda).

With all these positives there is still a very long way to go. Internet backhaul costs and quality hamper development of nations. As will be detailed later, even if geo-satellite costs were reduced the quality of internet over geo-satellite is so poor it prevents participation of the developing world in the new high bandwidth internet. Solving this problem requires a significant investment in leo-satellite technology and fiber networks.

2. Internet access fosters democracy

Often overlooked is the significant and crucial role the internet plays in fostering democracy. Internet access eliminates a one-way channel of communication, enhancing participatory government through both authored and anonymous critique. Furthermore, wide accessibility creates an open looking glass for peer review into the goings on in any particular country. In extreme instances, significant deprivations of human rights can quickly be seen by the world. The recent history of Rwanda would have been very different had internet access been available. In part, the belief that communications can free people drove this project.

In 1994 Rwandan citizens were limited to one source of information- a single Government radio station. This sole source and monopoly of information eliminated any opportunity for either dissension or education on varied viewpoints.

If participative democracy is the voices of many to form the will of the people into a coherent structure of laws and rules, then the internet is a great enabler. Driving the internet, blogs, forums and ad-hoc "journalism" deep into a growing nation will quicken the pace of freedoms in a public and transparent manner. Worldwide sharing of ideas and thoughts of citizenry reduces the possibility of propaganda and reduces the cost of keeping a helpful eye on growing economies.

3: It is in Americas' Interest to foster internet growth

Beyond the sale of equipment and services to create the infrastructure, the United States exports a significant amount of web based services. For example, almost ½ of Ebay and Google's sales are international[iii], Yahoo's growth is from International sales[iv], and all of the 20 most popular web sites are American.[v] Because American companies continue to lead the world in monetizing web users, it is in our economic interest to increase the total user pool.

The United States and U.S. foundations also spend billions of dollars on aid for developing countries. The programs would be significantly more efficient if a communications infrastructure existed. The difficulties of providing relief without communications are well known yet relatively little funding goes towards this development. Aid organizations spend too much on recreating ad-hoc communications systems because none are in place, and none will be funded. The distribution, logistics and educational issues they face are on the scale of Walmart's, but Walmart has an existing communications infrastructure to leverage.

4: Slow internet speeds hinders economic growth

Slow access speeds in the 1990's hindered the growth of the "World Wide Wait". New internet applications such as video, web 2.0, and ajax require higher bandwidth. Unfortunately much of the developing world is stuck with extremely slow access speeds.

Most of Africa is serviced by geo-stationary satellites. The satellites are so far away there is a ½ second delay for every signal. This "latency" reduces the effective end-user speed of the internet to about 176kbps no matter how large the pipe.

The Internet (tcp/ip) delivers packets like the post office delivers return receipt mail. The sender waits for confirmation from the destination (receipt) before sending the next packet. The continuous back to back round trips compound any delay caused by connection distance. Web pages "slow fill" section by section, for instance CNN.com may take 24 seconds to fully load over a high latency link.

If developing rural economies are going to benefit from the latest internet technologies and even contribute to their development, they must have access to them. Technically, lower latency is better and latency charts are standard requirements in service level agreements by service providers. For reference purposes, latency under 100ms is excellent (within continental US), and latency between 100ms and

300ms is adequate. Typical Geo-Satellite latency is 600ms. Soon "desktop applications" on web 2.0 will be common, but only for low latency users because few will wait ½ second for a menu item to open.

5: Conclusion

I have had the privilege of watching the Rwandan economy transform in three years from very little internet to one of the most advanced in Africa. I have worked with schools, the Government, NGO's and foundations to understand and support their technical needs. It is with this background that I offer this testimony on the significant positive economic and social effects of broadband on a rural economy.

It is my hope this testimony will offer guidance on the importance of broadband for development. Broadband creates significant efficiencies for every other initiative, whether for health, education, economy or democracy and its need is often overlooked because it plays only a supporting role. Broadband does not cure disease, but it can make the cure affordable.

Thank you again for the opportunity to appear before you today.

24 April, 2007

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[i] "U.S., and its stars, can help Africa", 05 Jan 2007, Philadelphia Enquirer
[ii] http://www.sfgate.com/cgi-bin/article.cgi?f=/c/a/2006/11/19/INGLBMDO3D1.DTL
[iii] http://biz.yahoo.com/ap/070418/earns_ebay.html?.v=6,
http://googlewatch.eweek.com/content/google_financials/google_4q_2006_revenue_up_67_over_2005.html
[iv] http://yhoo.client.shareholder.com/NEWS/Q107/238370.pdf
[v] http://internet.seekingalpha.com/article/25309